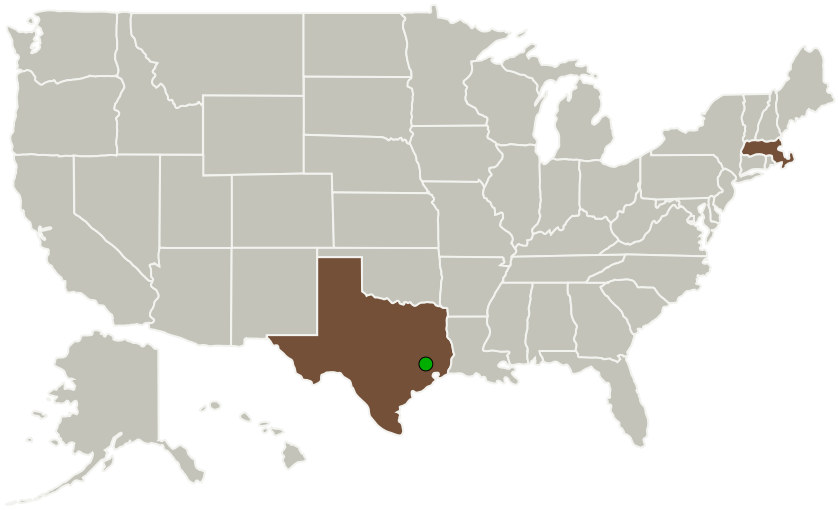
Miniaturized Sensor Array Platform for Monitoring Calcium, Conductivity, and pH in Urine Brine, Phase I

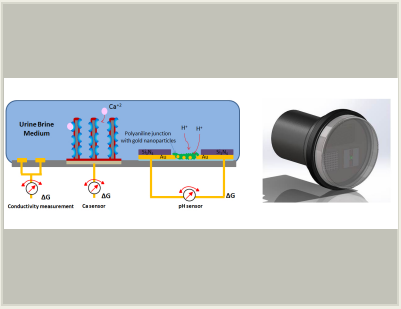
Completed Technology Project (2016 - 2016)

Project Introduction

In response to NASA SBIR Topic H3.01, Polestar Technologies Inc. proposes to develop a miniaturized sensor array platform for simultaneous monitoring of calcium, conductivity and pH in urine brine suitable for the international space station (ISS). The sensor platform will incorporate three different types of sensors: i) molecular recognition sensor elements incorporated onto nano-architecture for calcium detection, ii) Doped electronic material for pH measurement, and iii) a suitably designed microelectrode structure for conductivity determination. Phase I project will involve design and fabrication of the first generation sensor platform consisting of an electrochemical part (for calcium studies) and electronic part (for both pH and conductivity measurements). The capability of this platform to measure calcium in the range of 50-400mg/L, pH in the range of 0.5-5.0 and conductivity in the range of 10-250mS/cm will be demonstrated. In Phase II all the three types of sensor modalities will be integrated into a common platform. In addition, a handheld electronic readout unit will also be designed and fabricated in Phase II. This will serve as a basis for the development of a rugged detection system for applications on ISS.

Primary U.S. Work Locations and Key Partners





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Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Polestar Technologies, Inc.	Lead Organization	Industry	Needham Heights, Massachusetts
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Massachusetts	Texas

Project Transitions

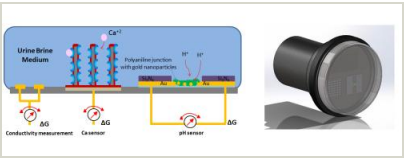
June 2016: Project Start

December 2016: Closed out

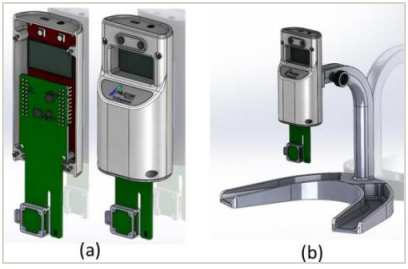
Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139835)*

Images



Briefing Chart Image
Miniaturized Sensor Array Platform for Monitoring Calcium, Conductivity, and pH in Urine Brine, Phase I
(https://techport.nasa.gov/image/126535)



Final Summary Chart Image
Miniaturized Sensor Array Platform for Monitoring Calcium, Conductivity, and pH in Urine Brine, Phase I Project Image
(https://techport.nasa.gov/image/126247)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Polestar Technologies, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

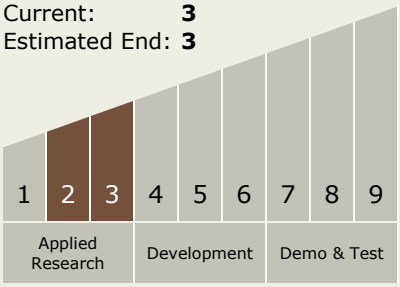
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Ranganathan Shashidhar

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Completed Technology Project (2016 - 2016)

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.4 Environmental Monitoring, Safety, and Emergency Response
    - TX06.4.1 Sensors: Air, Water, Microbial, and Acoustic

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System